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COMBINED WIRELESS SENDING AND RECEIVING SYSTEM.

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My invention relates to systems for simultaneously sending and receiving messages on the same apparatus, so that the same antenna may be used to both send and receive without necessitating switching.

More particularly, my invention relates to an apparatus for simultaneously sending and receiving radio messages and to the use of a double antennæ so arranged that there is a condenser action between the two branches, thus permitting the received oscillations to be caught, and to means whereby the sending of a message will not interfere with the simultaneous use of the apparatus as a receiving station.

In the past, changing a wireless apparatus from a sending to a receiving station has involved the act of switching. It has been difficult to both send and receive at the same time, if communications were being transmitted and received from the same station, for the reason that the waves sent from the home station are tuned to the length of those received and the receiving apparatus responds to both. It has not been possible to successfully send and receive simultaneously under the above outlined conditions.

This invention is conceived with the idea of rendering the simultaneous use of a wireless apparatus, both as a sending and a receiving station, feasible, and, at the same time, to accomplish that result while using the same antennæ. Heretofore, attempts have been made to use two sending antennæ and to locate a third receiving antenna between the two, at such a position that the radio oscillations in the two sending antennæ reacted at the position of the receiving antenna to produce the node of a standing wave. This method has been found highly impracticable because it has proved difficult to locate the exact position for the receiving antenna. Moreover, since the distance apart of the two antennæ to produce a standing wave varies with the wave length, it has been necessary to move the antennæ. By my disposition of apparatus, no careful adjustment of the distance between the antennæ is necessary and no third antenna need be used.

An object of my invention is to provide means for sending and receiving wireless messages without necessitating any switching operations.

With these and other objects in view, which may be incident to the improvements, my invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several elements comprising my invention may be varied in their proportions and arrangement, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown, in the accompanying drawings, means for carrying it into practical effect, without limiting the improvements in their useful applications to the particular constructions, which, for the purpose of explanation, have been made the subject of illustration.

Figure 1 is a diagrammatic view of a complete sending and receiving station;

Fig. 2 is a diagrammatic view illustrating the flow of current in the receiving apparatus;

Fig. 3 is a diagrammatic view illustrating the flow of the current in the sending apparatus.

In the drawings, referring particularly to Fig. 1, I have shown a double antenna 1, the two branches of which are connected to a variable inductance 2. In shunt through the inductance 2 is a circuit containing a variable capacitance 3. The inductance 2 and its capacitance 3 may be varied to tune the receiving circuit to any desired length of waves.

At the middle point of inductance 2 is a lead, as indicated at 4, which is connected to a variable inductance 5 and, through a capacitance 6, to the ground. Connected across both sides of the variable inductance 5 is a variable capacitance 7 and, by changing the values of the inductance 5 and the capacitance 7, the sending circuit may be tuned to any desired wave length. In circuit through the inductance 5 and the capacitance 6 is a filament element 8 and a plate element 9 of an electron tube 10 having a grid element 11 connected to the inductance 5 so that there is the necessary feed back between grid and plate circuits for sustained oscillations.

A suitable battery 12 provides current for